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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,207	09/18/2003	Laurent Eschenauer	MR2833-34	8288

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ELLICOTT CITY, MD 21043

EXAMINER
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PATEL, NIRAV B

ART UNIT	PAPER NUMBER
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2135

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/29/2006	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/666,207		ESCHENAUER ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Nirav Patel		2135	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 September 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/23/04</u> .   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This action is in response to the application filed on 09/18/03.
2. Claims 1-22 are under examination.

### **Claim Objections**

3. Claim 22 is objected to because of the following informalities:

Claim 22 is an improper form of dependent claim, because system claim 22 is in consistence with the method claim 1.

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 15, 16 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasahara et al. (U. S. Patent No. 6,788,788) and in view of Gelvin et al (US Patent No. 7,020,701).

As per claim 1, Kasahara teaches:

prior to deployment of a plurality of sensor nodes (i.e. entities), storing, in each sensor node, a respective key ring formed of randomly selected keys, a respective pair of said

key rings sharing, with a predetermined probability, at least one key [Fig. 1, 2 or 7 and 8, col. 5 lines 57-67, col. 6 lines 1-45, col. 8 lines 38-50, col. 11 lines 15-26, col. 12 lines 34-44, col. 13 lines 14-34]; upon deployment of said plurality of the sensor nodes, discovering by at least one sensor node of said plurality of the sensor nodes for at least another sensor node sharing said at least one key with said at least one sensor node to establish a secure communication link between said one and another sensor nodes [Fig. 1 and 2 or 7 and 8 col. 21 lines 10-63]; and using said at least one key for secure communication between said at least one and another sensor nodes over said secure communication link established therebetween [Fig. 1 and 2 or 7 and 8 col. 21 lines 10-63].

Gelvin teaches plurality of sensor nodes of the Distributed Sensor Network [Fig. 2 or 9]. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Gelvin with Kasahara, since one would have been motivated to provide the cryptographic communication (i.e. secure communication) and high degree of security in the Distributed Sensor Network [Kasahara, col. 3 lines 38, 40].

As per claim 15, the rejection of claim 1 is incorporated and Kasahara teaches:

assigning a path-key to a selected pair of sensor nodes connected by at least two communication links [Fig. 1, col. 4 lines 1-60, col. 8 lines 45-50].

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As per claim 16, it is a system claim corresponds to method claim 1 and is rejected for the same reason set forth in the rejection of claim 1 above.

As per claim 22, the rejection of claim 1 is incorporated and further claim 22 is a system claim corresponds to method claim 15 and is rejected for the same reason set forth in the rejection of claim 15 above.

5. Claims 2, 3, 4, 13, 14, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasahara et al. (U. S. Patent No. 6,788,788) in view of Gelvin et al (US Patent No. 7,020,701) and in view of Dinsmore et al (US Patent No. 7,043,024).

As per claim 2, the rejection of claim 1 is incorporated and Kasahara teaches:

for each said sensor node (i.e. entity), randomly selecting a distinct set of the keys to form said respective key ring [col. 5 lines 57-67, col. 6 lines 1-45].

Dinsmore teaches:

generating a key space, randomly selecting a pool of keys from said key space, assigning a specific key identifier (e.g. K1, K2,....., K7,.....,K15 etc.) for each key from said pool of keys [Fig. 7].

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Dinsmore with Kasahara and Gelvin, since one would have been motivated to distribute the key and provide secure group communication in the distributed network [Dinsmore, col. 1 lines 12, 15-17].

As per claim 3, the rejection of claim 2 is incorporated and Dinsmore teaches:  
assigning to each said sensor node a specific sensor identifier (e.g. U1, U2, ...etc.) [Fig. 1, col. 11→ table 1].

As per claim 4, the rejection of claim 2 is incorporated and Dinsmore teaches:  
loading to said at least one sensor node a specific key identifier of each key on said key ring of said at least one sensor node [col. 11→ table 1, Fig. 6], and broadcasting said key identifiers associated with said at least one sensor node to discover said at least another sensor node [col. 1 lines 17-19, col. 7 lines 60-67, col. 1-3].

As per claim 13, the rejection of claim 1 is incorporated and Dinsmore teaches:  
upon expiration of at least one key shared by said at least one and another sensor node, removal of said expired at least one key from said key rings of said at least one and another sensor nodes, and searching for another key common for said at least one and another sensor nodes to establish a new communication link therebetween [col. 12 lines 5-62, Fig. 8A, 9].

As per claim 14, the rejection of claim 2 is incorporated and Dinsmore teaches:  
generating a connectivity random graph for said Distributed Sensor Network, and computing the number of the sensor nodes, the number of keys in said pool of keys and

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the size of each said key ring, sufficient to provide for a connected Distributed Sensor Network [Fig. 13].

As per claim 17, the rejection of claim 16 is incorporated and further claim 17 is a system claim corresponds to method claim 2 and is rejected for the same reason set forth in the rejection of claim 2 above. Further, Dinsmore teaches randomly selecting at least two distinct sets of keys from said pool of keys [col. 7 lines 8-16, Fig. 7].

As per claim 18, the rejection of claim 17 is incorporated and further claim 17 is a system claim corresponds to method claim 4 and is rejected for the same reason set forth in the rejection of claim 4 above.

6. Claims 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasahara et al. (U. S. Patent No. 6,788,788) in view of Gelvin et al (US Patent No. 7,020,701) in view of Dinsmore et al (US Patent No. 7,043,024) and in view of Kasahara et al. (U. S. Patent No. 7,080,255).

As per claim 5, the rejection of claim 3 is incorporated and Kasahara ('788) teaches a controller node (i.e. center) [Fig. 1].

Kasahara ('255) teaches a plurality of controller nodes associated with said sensor nodes in a predetermined order [Fig. 2].

Dinsmore teaches:

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saving said key identifiers of the keys in said respective key ring of each said sensor node along with said sensor identifier of said each sensor node on a trusted controller node from said plurality of controller nodes [col. 11 → table 1, col. 7 lines 58-60].

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Kasahara ('255) with Kasahara ('788), Gelvin and Dinsmore, since one would have been motivated to provide the cryptographic communication (i.e. secure communication) and high degree of security in the Distributed Sensor Network [Kasahara, col. 3 lines 38, 40].

As per claim 18, the rejection of claim 17 is incorporated and further claim 17 is a system claim corresponds to method claims 4 and 5 and is rejected for the same reason set forth in the rejection of claims 4 and 5 above.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasahara et al. (U. S. Patent No. 6,788,788) in view of Gelvin et al (US Patent No. 7,020,701) in view of Dinsmore et al (US Patent No. 7,043,024) and in view of Briscoe (US Pub. No. 2003/0044017).

As per claim 6, the rejection of claim 4 is incorporated and Dinsmore teaches broadcast the key identifiers [col. 1 lines 17-19].

Briscoe teaches sending the key identifiers (i.e. key index) in a clear text [Fig. 5, paragraph 0064 lines 4-5].



Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Briscoe with Kasahara, Gelvin and Dinsmore, since one would have been motivated to provide the cryptographic communication (i.e. secure communication) [Kasahara, col. 3 line 38].

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasahara et al. (U. S. Patent No. 6,788,788) in view of Gelvin et al (US Patent No. 7,020,701) in view of Dinsmore et al (US Patent No. 7,043,024) and in view of Akiyama et al (US Pub. No. 2003/0002680).

As per claim 7, the rejection of claim 4 is incorporated and Dinsmore teaches broadcast the key identifiers [col. 1 lines 17-19].

Akiyama teaches transmitting the encrypted key identifiers (i.e. in a hidden pattern) [Fig. 33].

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Briscoe with Kasahara, Gelvin and Dinsmore, since one would have been motivated to provide the cryptographic communication (i.e. secure communication) [Kasahara, col. 3 line 38].

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasahara et al. (U. S. Patent No. 6,788,788) in view of Gelvin et al (US Patent No. 7,020,701) in

view of Dinsmore et al (US Patent No. 7,043,024) in view of Kasahara et al. (U. S. Patent No. 7,080,255) and in view of Hardjono (US Patent. No. 6,584,566).

As per claim 8, the rejection of claim 5 is incorporated and Hardjono teaches:

computing a sensor-controller key shared by said each sensor node with said trusted controller, and loading said trusted controller and said each sensor node with said sensor-controller key [Fig. 1].

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Hardjono with Kasahara ('788), Gelvin, Dinsmore and Kasahara ('255), since one would have been motivated to provide secure multicast communication [Hardjono, col. 1 lines 15-16].

10. Claims 9, 10, 11, 12, 20, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasahara et al. (U. S. Patent No. 6,788,788) in view of Gelvin et al (US Patent No. 7,020,701) in view of Dinsmore et al (US Patent No. 7,043,024) in view of Kasahara et al. (U. S. Patent No. 7,080,255) and in view of Perlman (US Patent No. 5,455,865).

As per claim 9, the rejection of claim 5 is incorporated and Dinsmore teaches:

upon compromising of at least one sensor node, revoking said at least one compromised sensor node by broadcasting from said trusted controller a revocation message (i.e. notification) [col. 12 lines 26-28, Fig. 8A, 9].

Dinsmore teaches revoking the at least one compromised sensor node by notifying from the trusted server [col. 12 lines 26-28]. Dinsmore doesn't expressively mention that message containing a signed list of the key identifiers.

Perlman teaches message containing a signed list of the key identifiers [Fig. 8A].

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Hardjono with Kasahara ('788), Gelvin, Dinsmore and Kasahara ('255), since one would have been motivated to minimize disruption to message delivery due to malfunctioning nodes in a network [Perlman, col. 2 lines 31-32].

As per claim 10, the rejection of claim 9 is incorporated and Dinsmore teaches the trusted server communicates with the group of N users through N respective unicast communications channels [col. 1 lines 19-21 → i.e. unicasting the signature key to each said sensor node].

As per claim 11, the rejection of claim 10 is incorporated and Perlman teaches receiving the packet and verifying the signature and said signed list of key identifiers [col. 6 lines 35-41].

Dinsmore teaches locating said key identifiers in said key ring of said uncompromised sensor node, and removing keys corresponding to the key identifiers of the compromised keys from said key ring of said uncompromised sensor node [Fig. 9,11 col. 12 → table 2, 3].

As per claim 12, the rejection of claim 9 is incorporated and Dinsmore teaches:  
reconfiguring the communication links of the sensor nodes affected by revocation of  
said compromised sensor node [Fig. 8A, 8B, 10, col. 12 → table 2, 3].

As per claim 20, the rejection of claim 19 is incorporated and further claim 20 is a  
system claim corresponds to method claim 9 and is rejected for the same reason set  
forth in the rejection of claim 9 above.

As per claim 21, the rejection of claim 20 is incorporated and further claim 21 is a  
system claim corresponds to method claim 12 and is rejected for the same reason set  
forth in the rejection of claim 12 above.

### **Conclusion**

11. The prior art made of record and not relied upon is considered pertinent to  
applicant's disclosure.

Hardjono (US 6993138) --- Spatial key trees for key management in wireless  
environments.

Mittra (US 5748736) --- System and method for secure group communications via  
multicast or broadcast

Kadansky et al (US 6295361) --- Method and apparatus for multicast indication of group key change

Gundavelli et al (US 6941457) --- Establishing a new shared secret key over a broadcast channel for a multicast group based on an old shared secret key

Dondeti et al (US 6240188) – Distributed group key management scheme for secure many-to-many communication

Epstein et al (US 6694025) --- Method and apparatus for secure distribution of public/private key pairs

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nirav Patel whose telephone number is 571-272-5936. The examiner can normally be reached on 8 am - 4:30 pm (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Vu can be reached on 571-272-3859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*NBP*

*12/18/06*

  
KIM VU  
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